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Jet Propulsion Laboratory

This fact sheet briefly describes NASA's efforts for cleaning up chemicals from groundwater beneath the Jet Propulsion Laboratory. A more detailed description of all JPL cleanup activities is available at local Information Repositories (listed on the back), and online at **http://JPLwater.nasa.gov.**

CLEANING UP GROUNDWATER BENEATH JPL

While developing the final groundwater cleanup solutions for JPL, NASA is also planning to conduct an Expanded Treatability Study to remove the higher concentrations of volatile organic compounds (VOCs) and perchlorate found in groundwater beneath JPL (the area referred to as On-JPL). This Study is referred to as "expanded" because it increases the size of the treatment system to clean more groundwater at a faster rate than seen in previous tests. Conducting the Expanded Treatability Study now will have several benefits:

►Evaluates effectiveness and reliability of the system design before going full-scale

►Cleans up a portion of groundwater on the site

►Keeps chemicals from spreading in groundwater

From Small-Scale Study to Expanded Treatability Study

Over the past several years, NASA has conducted a number of pilot tests - pumping and treating relatively small amounts of groundwater from localized areas at JPL. These pilot tests helped NASA to see how well different VOC and perchlorate treatment technologies - being used successfully at other cleanup sites - work under specific conditions found at JPL (see side bar).

Site Conditions NASA Considered

Concentration of chemicals

Type of soil and permeability

Groundwater flow and velocity

Pumping location and volume

NASA's Five Small-Scale Tests at JPL

►In 1999, NASA, with US Filter, conducted a preliminary study to evaluate the effectiveness of reverse osmosis in removing perchlorate.

►NASA with the Calgon Carbon Corporation completed a six-month study in March 1999 using an Ion Exchange perchlorate removal system. In January 2000, the California Department of Health Services (DHS) gave its conditional acceptance to the system based, in part, on some of the data from this JPL study.

►NASA with US Filter and Envirogen conducted a small six-gallons-per-minute test combining a Liquid-phase Granular Activated Carbon (LGAC) process to remove VOCs and a Fluidized Bed Reactor to remove perchlorate. Completed in 2001, this system is the focus of NASA's Expanded Treatability Study described in this fact sheet.

►In October 2002, NASA and Foster Wheeler completed a test at JPL of a Packed Bed Reactor, a biological treatment for removing perchlorate.

►NASA and Arcadis looked at removing perchlorate while the water remained in the ground - injecting a 2% corn syrup solution to promote growth of the natural bacteria population to destroy perchlorate. The study was completed in August 2003.

Expanded Treatability Study

NASA will conduct the Expanded Treatability Study on the highest concentration of VOCs and perchlorate in groundwater beneath eight acres in the north-central section of JPL. NASA intends to begin Phase 1 of the two-phased study in late 2004 (see side bar).

Phase 1
NASA plans to install one multi-level extraction, or pumping well, and two multi-level injection wells during Phase 1 - pumping and treating 100 gallons of groundwater per minute.

Phase 2
If Phase 1 proves effective, NASA will install one additional pumping well and two additional injection wells to increase the treatment capacity - pumping and treating 250 gallons of groundwater per minute.

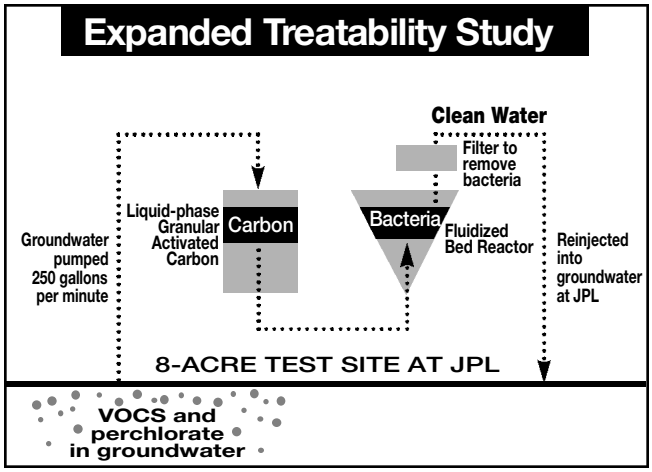
Groundwater Cleanup Technologies

Removing VOCs

For the treatment of VOCs, NASA is using a proven effective system called Liquid-phase Granular Activated Carbon. As groundwater flows through vertical tanks, very porous carbon particles attract and accumulate the molecules of VOCs where they can be removed from the water, collected and properly disposed.

Removing Perchlorate

In this system, called a Fluidized Bed Reactor, vertical tanks contain a bed of granular activated carbon where, when nutrients are added, naturally occurring bacteria multiply to form a thin layer over the activated carbon called a biofilm. As groundwater is pumped upward through the biofilm, the bacteria take in perchlorate and destroy it, reducing it to water and chloride. The water then passes through a filter to remove the bacteria.



NASA plans to pump the groundwater and pipe it to a treatment facility to remove VOCs and perchlorate. The filtered treated water would then be reinjected into the groundwater beneath JPL.

If the Expanded Treatability Study is successful, NASA will develop a plan to make this treatment system a part of the overall and final site groundwater cleanup solution.

To Learn More About It

Information on these technologies and other JPL cleanup activities is available online at http://JPLwater.nasa.gov and at the following Information Repositories:

La Cañada Flintridge Public Library
4545 Oakwood Ave.
La Cañada Flintridge,
California 91011
818-790-3330

Pasadena Central Library
285 E. Walnut St.
Pasadena, California 91101
626-744-4052

Altadena Public Library
600 E. Mariposa Ave.
Altadena, California 91001
626-798-0833

JPL Repository
(JPL Employees Only)
4800 Oak Grove Dr.
Bldg. 111
818-354-4200

For more information, contact

Merrilee Fellows
Water Cleanup Outreach Manager
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